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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/710,526	07/19/2004	Anwar Husen	56.0753	4525

27452 7590 11/29/2007

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EXAMINER	
PLANTE, JONATHAN R	
ART UNIT	**PAPER NUMBER**
2182	
NOTIFICATION DATE	**DELIVERY MODE**
11/29/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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4A

Office Action Summary	Application No.	Applicant(s)	
	10/710,526	HUSEN ET AL.	
	Examiner	**Art Unit**	
	Jonathan R. Plante	2182	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 September 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to the applicant's communication filed 19 September 2007 in response to PTO Office Action mailed 25 June 2007. The Applicant's remarks and amendments to the claims and/or the specification were considered with the results that follow.

Claim Amendments

2. Acknowledgment of receiving amendments to the claims, which were received by the Office on 19 September 2007. Claims 1, 3, 8, and 9 are amended and claims 12-18 are new.

The objections to the claims have been withdrawn due to amendment filed on 19 September 2007.

Response to Arguments

3. Applicant's arguments with respect to claims 1-18 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

4. Claims 1 are objected to because of the following informalities:

a. (Claim 1, Line 4): Replace "well logging" with "the well logging" to resolve potential lack of antecedent basis issues.
b. (Claim 1, Line 5): Replace "pressure" with "the pressure" to resolve potential lack of antecedent basis issues.
c. (Claim 1, Line 6): Replace "PVT" with "the PVT" to resolve potential lack of antecedent basis issues.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

(Claim 11: Recites the limitation "the model" which is indefinite since "the model" can refer to "the base model" or "the optimized model".

The Examiner will interpret "the model" as referring to "the optimized model".

Appropriate correction is required.

7. Claim 15 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

(Claim 15): Recites the limitation "turbulent gas flow" and the Applicant directed Examiner to Paragraph 0027 of the specification specifically "compensation for the gases flowing in the fracture". The Examiner has reviewed Paragraph 0027 and has failed to find support for the term "turbulent".

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. **Claims 1-14 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roggero et al. (US 6,662,109 B2 December 9, 2003) and in further view of Wright et al. (US 2003/0205375 A1 November 6, 2003).**

(Claim 8): Roggero et al. teaches, "A method for generating optimized performance data in a subterranean well, comprising the steps of:

a. introducing known pressure transient data, well logging data, fracture height and perforation length and PVT data for the well into a base model, **["calculate the derivatives of the main production results (pressure, saturation, flow rate, etc) in relation to the petrophysical properties (permeability, porosity, etc) assigned to zones of a reservoir" (Column 5, Line 58), "dynamic data are for example production data such as the pressure, the gas-oil ration (GOR) or the fraction of water in the oil" (Column 8, Line 60), "a fine geological model representative of the distribution, in a reservoir, of a physical quantity characteristics of the subsoil structure" (ABSTRACT)** and **"Techniques for integrating natural fracturing data into fractured reservoir models are also known in the art. Fracturing data are mainly of a geometric nature and include measurements of the density, length, azimuth and tilt of fracture plane" ("Discussion of the Prior Art", Paragraph 0011)]**

b. producing a performance prediction from the base model; **[parameters of the simulation model are adjusted, this model can be used to simulate the present and future behavior of the reservoir (Column 2, Line 15)]**

c. comparing the performance prediction with actual performance; **[an objective function which measures the difference between the dynamic data observed in the field and the simulation results obtained for a set value of parameters θ (Column 4, Line 30)]**

d. modifying the model to generate a performance prediction that matches the actual performance for producing an optimized model. **[constrained reservoir**

characterization is to determine the parameters of the simulation model so that the latter can reproduce the production data of the reservoir to be modeled. This parameter estimation stage is also referred to as production data fitting. The flow simulation model is thus compatible with all of the available static and dynamic data (Column 1, Line 61)].

However, Roggero et al. fails to teach explicitly "an induced fracture height and perforation length".

Wright et al. teaches, "an induced fracture height and perforation length" ***[A data acquisition and analysis system to determine induced fracture width and length as well as fracture closure stress, net facture pressure, and facture fluid efficiency (Paragraphs 0197-0200)].***

It would have been obvious to one skilled in the art to combine Roggero et al. with Wright et al. to create a more accurate model of the subterranean well. By including the induced fracture width and height, in addition to orientation relative to the pay zone (e.g. area containing oil) allows for a more accurate model allowing engineers to increase production in addition to selecting optimized subterranean well locations to take advantage of the induced fracturing of the pay zone.

Roggero et al. and Wright et al. are analogous art in that both Roggero et al. and Wright et al. deal with oil well (subterranean well) modeling and measuring.

(Claim 9): In further view of Claim 8, Wright et al. teaches, "wherein the PVT data comprises data for a number of layers involved in the well modeled" ***[Depicted in Figure 1 "Facture Zone" (Figure 1, 22) and "Pay Zone" (Figure 1, 16) that are layers involved in the well modeling. Figure 1 also depicts geological layers 14a-e (Paragraph 0169)].***

(Claim 10): In further view of Claim 8, Roggero et al. teaches, "wherein optimized model is generated by comparing the performance prediction and actual performance for a first, known zone" **[rejected using the same rationale as per the rejection of claim 1]** "optimized model is utilized to predict performance data for an unknown zone" **[Characterizing a well during operations relating to creating or operating the well can provide various information about what is down hole in the well or adjacent subterranean formations. This information may be used in performing the operation(s) on the respective well, or it may be useful in planning or conducting operations on other wells. (0016)].**

(Claim 11): In further view of Claim 10, Wright et al. teaches, "wherein the **[optimized]** model is repeatedly optimized as actual performance data for multiple zones is collected" ***[For optimized field development the knowledge of multiple boreholes***

can be used (Paragraph 0182)]. However, Wright fails to teach that the model is optimized for multiple zones.

It is obvious to one skilled in the art to combine the teachings of Roggero et al. in Claim 10 with the teachings of Wright in Claim 11 for updating the model using data from multiple zones (boreholes). By updating the model with actual data from multiple zones allows for a more accurate and complete study of the larger oil field where geography changes across the field.

(Claim 1): In further view of Claim 8, Roggero et al. teaches, "a. a base model **[The simulation model is preferably first calibrated (Column 8, Line 42)]**

b. an input device for inputting well logging data into the base model; **["allows updating by the dynamic production data, a fine geological model representative of the distribution in the reservoir of a physical quantity characteristic of the subsoil structure (the permeability or the porosity of the reservoir rocks for example)" (Column 8, Line 8)**, **"dynamic data are for example production data such as the pressure, the gas-oil ration (GOR) or the fraction of water in the oil" (Column 8, Line 60)]**

c. an input device for inputting pressure transient data into the base model; **["dynamic data are for example production data such as the pressure, the gas-oil ration (GOR) or the fraction of water in the oil" (Column 8, Line 60)]**

d. an input device for inputting PVT data into the base model; **["allows updating by the dynamic production data, a fine geological model representative of the distribution in the reservoir of a physical quantity characteristic of the subsoil structure (the permeability or the porosity of the reservoir rocks for example)" (Column 8, Line 8),"dynamic data are for example production data such as the pressure, the gas-oil ration (GOR) or the fraction of water in the oil" (Column 8, Line 60), Figures 2, 3, and 5]**

e. a numerical interpreter for calculating predicted performance of the well; **[parameters of the simulation model are adjusted, this model can be used to simulate the present and future behavior of the reservoir (Column 2, Line 15)** and **"power of current computers" (Column 2, Line 41)]**

f. a match system for comparing actual performance data with calculated predicted performance data based on the base model; and **[an objective function which measures the difference between the dynamic data observed in the field and the simulation results obtained for a set value of parameters θ (Column 4, Line 30)]**

g. a reiterative loop for modifying the base model to provide a match between the actual performance data and the predicted performance data to optimize the base model **[constrained reservoir characterization is to determine the parameters of the simulation model so that the latter can reproduce the production data of the reservoir to be modeled. This parameter estimation stage is also referred to as production data fitting. The flow simulation model is thus compatible with all of the available static and dynamic data (Column 1, Line 61)].**

(Claim 2): In further view of Claim 1, Roggero et al. teaches, "further including a data editing module for editing the pressure transient data before it is input into the base model" **[as the parameters of the simulation model are adjusted, this model can be used to simulate the present and future behavior of the reservoir (Column 2, Line 16)].**

(Claim 3): Roggero et al. discloses, "further including a plotting device for plotting the data generated by the model system" **[Figures 4 – 7, 10-16, 18-20].**

(Claim 4): In further view of Claim 3, Roggero et al. teaches, "wherein the plotting device is adapted for plotting line fitting on specialized plots" **[FIGS. 19A to 19E show comparison between the pressure data and the simulation results after fitting (Column 10, Line 7)].**

(Claim 5): In further view of Claim 3, Roggero et al. teaches, "wherein the plotting device is adapted for plotting specialized plots providing preliminary estimates of performance data based on the base model" **[FIG. 13 shows an initial geostatistical model (Column 9, Line 61)].**

(Claim 6): In further view of Claim 3, Roggero et al. teaches, "wherein the plotting device is adapted for generating a 3D display of the well" **[FIG. 16 shows a constrained geostatistical model (Column 10, Line 1)]**.

(Claim 7): In further view of Claim 3, Roggero et al. teaches, "wherein the plotting device is adapted for generating performance data plots based on the optimized model" **[FIG. 4 shows the derivatives of the simulation results in relation to the parameterization of the geostatistical model (Column 9, Line 43)]**.

(Claim 12): In further view of Claim 8, Wright et al. teaches, "the method further comprising determining the induced fracture height and perforation length according to pressure data observed in conjunction with a fracture treatment" ***[A frac pump is connected to the well head for inducing fracturing, and the tiltmeter array (measuring device) collects continuous data on the induced earth deformation (fracture) verses time (Paragraphs 0197-0198). Where the tiltmeter provides fracture width and height (Paragraph 0200). The tilt meter also provides pressure and temperature data (Paragraph 0218)].***

(Claim 13): In further view of Claim 12, Wright et al. teaches, "wherein the PVT data varies within the induced fracture" ***[The tilt meter contains sensors for providing pressure and temperature data (Paragraph 0218) and depicted in Figure 29 are multiple tiltmeters (Figure 29, Indexes 134a-134n) that are positioned at varies***

levels and provide the pressure and temperature data at the varies levels within the fracture zone (perforation zone (Figure 29, 20)].

(Claim 14): In further view of Claim 8, Wright et al. teaches, "the method further comprising introducing non-Darcy factors into the base model" ***[The tiltmeter provides fracture width and height (Paragraph 0200)].***

(Claim 16): In further view of Claim 8, Wright et al. teaches, "wherein the actual performance comprises a pressure transient" ***[The application of using tiltmeter to collect data versus time (Paragraph 0025). Where the data collected by the tiltmeter includes fracture growth (volume) (Paragraph 0025) and also pressure and temperature (Paragraph 0218)].***

(Claim 17): In further view of Claim 8, Roggero et al. teaches, "wherein the actual performance comprises a production value" ***[Using dynamic production data (actual performance data) (Column 8, Line 9) where dynamic data includes production values (data) for pressure, gas-to-oil ratio, and fraction of water in oil (Column 8, Lines 60-63)].***

(Claim 18): In further view of Claim 8, Wright et al. teaches, "wherein the pressure transient data comprises pressure transient data resulting from a mini-frac test" ***[The tilt meters system provides data acquisition and analysis to map fracture height***

growth in real-time on mini-frac pumping tests. Where the analysis includes fracture width and length, fracture closure stress, net fracture pressure and fracture fluid efficiency (Paragraph 0200)].

10. **Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Roggero et al. (US 6,662,109 B2 December 9, 2003) and in further view of Wright et al. (US 2003/0205375 A1 November 6, 2003) as applied to claim 14 above, and further in view of Choe et al. (US 2003/0139916 A1 July 24, 2003).**

(Claim 15): In further view of Claim 14, Roggero et al. teaches, that the production data includes the gas-to-oil ratio (Column 8, Lines 60-63). However Roggero et al. fails to explicitly teach, "wherein the non-Darcy factors comprise compensation for turbulent gas flow in a fracture".

Choe et al. teaches the application of calculation for simulation both the laminar and turbulent gas flows using equations in the art such as the Fanning's equation for laminar flow regions or Newtonian, Bingham plastic, and Power-law equations in turbulent regimes.

It would have been obvious to combine Roggero et al., Wright et al., and Choe et al. to generate a more accurate base model of the oil/gas field. By combining Roggero and Wright with Choe allows for the turbulent gas flow within oil/gas field to be modeled.

Roggero, Wright, and Choe are analogous art in that they all deal with hydrocarbon well modeling and simulation.

Examiner Note: The Examiner also notes that it would be obvious to one skilled in the art to account for in the model and simulation for material phase changes (e.g. ice to water, liquid to gas). Each chemical compound has specific chemical and physical properties that need to be accounted for when modeling them. Take for example water (H2O) at standard atmospheric pressure and above 32 degrees Fahrenheit water is a liquid but when the temperature is 32 degrees water undergoes a phase change and becomes a solid. If you increase the pressure to above 1 atmospheric pressure the temperature that water solidifies is decreased. The same properties would have been obvious to consider when modeling subterranean wells. When drilling and fracturing the subterranean pressure and temperature are increased or decreased resulting in potential phases changes of the materials.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

12. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan R. Plante whose telephone number is (571) 272-9780. The examiner can normally be reached on Monday -- Thursday 10:00 AM to 4:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alford Kindred can be reached on (571) 272-4037. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

14. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

November 19, 2007

/Jonathan R. Plante/
Examiner Art Unit 2182

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SUPERVISORY PATENT EXAMINER